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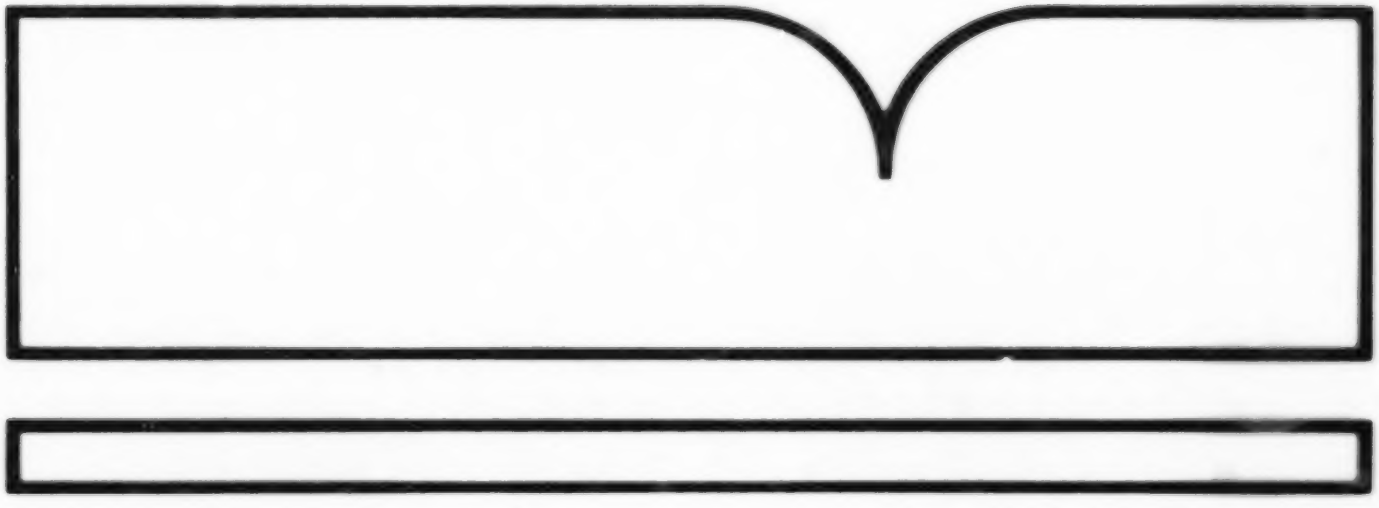

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JOURNAL ARTICLE

Editorial

Edwin E. Geldreich; Anita K. Highsmith; William J. Martone, MD

Public Whirlpools— The Epidemiology and Microbiology of Disease

In March 1984, the American Society for Microbiology sponsored a seminar on "Public Whirlpools: The Epidemiology and Microbiology of Disease." The seminar provided a forum to discuss public health concerns related to whirlpool use such as pool operation; clinical and epidemiologic aspects of disease associated with whirlpool use, including host factors; characteristics of microorganisms isolated from whirlpools and bathers; and public health implications of whirlpool use. This editorial introduces the following collection of papers, which resulted from that seminar.

The history of whirlpool use in hospitals and the professional sports arena is well known. Increased interest in physical fitness regimes, the popularity of the whirlpool in homes, and the high visibility of whirlpools on television soap operas have all contributed to a greater exposure of the general public to the delights and, at times, the public health implications of communal bathing. It has been estimated that the number of hot tubs and whirlpools nationwide has reached 620,000 in the last 5 years.

EPIDEMIOLOGIC RECORD

In this issue Jacobson discusses the epidemiologic record and underlines the public health issues: whirlpool-associated infections occur in outbreaks, and a variety of microorganisms have been implicated. Highsmith and Schiemann outline the microbiologic aspects of public whirlpools and whirlpool-associated infections. They point out that *Pseudomonas aeruginosa* is by far the most frequently reported etiologic agent in whirlpool infections. This may be due to the fact that *P. aeruginosa* can rapidly colonize a whirlpool or, less likely, that *P. aeruginosa* is relatively easy to detect and is better known than other potential pathogens. *P. aeruginosa* serogroup 11 and possibly serogroup 9 are the most frequently isolated pathogenic strains; active production of extracellular enzymes may be associated with the virulence of these strains. The illnesses most frequently associated with *P. aeruginosa* are dermatitis and folliculitis. The incubation period before onset of illness varies from less than 8 hours to 2 weeks after exposure. Other signs and symptoms include malaise, fatigue, otitis externa, mastitis and, rarely, bacteriuria and pneumonia. Solomon reviews the host factors that contribute to infections.

Invasion of the healthy body may be aided by the presence of chemical irritants, high temperatures which cause the skin pores to dilate, exposure time in water, friction from tight swimsuits and, for the less commonly reported whirlpool-associated respiratory illnesses, increased inhalation exposure to bacteria-laden aerosols.

Documented whirlpool-associated infection outbreaks are by no means restricted to *P. aeruginosa*. *Legionella pneumophila* serogroup 6 was found to be the cause of two Pontiac fever outbreaks associated with whirlpools.[1] In one investigation, the duration of fever was directly related to length of exposure to the aerosols created by the induced water turbulence of the whirlpool bath. Limited studies on aerosol particles generated in aerated water suggest the droplets in the air over a whirlpool are small enough (0.5 to 8.0 μm) to be inhaled and reach the lungs; droplets of 2 μm or larger could carry *Legionella*, if present. Pontiac fever occurring in association with whirlpools is not a commonly reported problem, but public health officials should be aware of the potential for such outbreaks.

ENVIRONMENTAL FACTORS

The source of water for whirlpools is most often potable drinking water although some spas may use mineral spring waters. While this water may initially meet drink-

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ing-water regulations for coliform bacteria and disinfectant residuals, its quality may change dramatically once it is introduced into the whirlpool. Bathers quickly introduce organisms from skin surfaces. Bathers also shed body oils, epithelial cells, and perhaps fecal debris into the water. These substances add turbidity to the water, create a high disinfectant demand, and may protect organisms from exposure to available disinfectant residuals. High water temperatures and turbulence also contribute to dissipation of the halogen-disinfectant.

MONITORING FOR QUALITY CHANGES

Water quality in public whirlpools must be monitored carefully for changes in chemical/physical characteristics. Davis and Castle outline each area that needs to be considered. Davis makes specific recommendations for monitoring halogen-disinfectant levels and ensuring that acceptable levels are maintained. As indicated by Schiemann, routine bacteriologic monitoring of pool water is not recommended. Microbiologic sampling should be reserved for special studies or for investigations of whirlpool-associated illness. Finally, Castle points out other non-infectious whirlpool-associated illnesses of public health significance and summarizes the role of public health agencies in monitoring whirlpools and investigating infectious and non-infectious problems associated with whirlpools.

ENGINEERING DESIGN

The proceedings of this seminar should be of interest to persons in the public and private sectors concerned with recreational waters, but in particular to public health officials confronted with the potential health problems associated with whirlpool use. Proper operator training is paramount; for public whirlpools, certification and periodic recertification of operators by local health authorities to assure maintenance of acceptable operational practices has been recommended. Better consumer awareness of proper whirlpool sanitation practices to minimize health problems should be stressed. Finally, there should be more general awareness of a useful document, *Suggested Health and Safety Guidelines for Public Spas and Hot Tubs,* published in 1981 and revised in 1985 by the Centers for Disease Control.[2] This document should serve as a key reference for all individuals involved in maintaining whirlpools.

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